Polarity in Bending Deformation in InSb Crystals : II. Theory and Supplementary Experiments(Physics)

on the values of $\bar{v}$ and N_m which the crystal has assumed previously. A transient stage of about 0.5% in strain is found to exist when the state of dislocations motion is transferred from one equilibrium state to another by the change of strain rate.

A Model for the Dynamical State of Dislocations in Crystals during Deformation

Koji SUMINO

Mater. Sci. Eng., **13** (1974), 269.

The equilibrium state of moving dislocations in a crystal during the constant strain-rate deformation is discussed on the basis of three hypotheses. I. The configuration of immobile dislocations is such that static free energy of the crystal associated with existing immobile dislocations be as low as possible. II. There are certain equilibrium stationary values in the density and the velocity of moving dislocations which depend on the rate-controlling mechanism of dislocation motion and on the deformation condition. III. The equilibrium state of moving dislocations is determined so as to make the component of the flow stress associated with moving dislocations minimum to maintain the given strain rate.

This model is shown to give a good description of the strain-rate dependence of the deformation behavior in germanium crystals at 600°C observed experimentally.

Polarity in Bending Deformation of InSb Crystals. I. Experiments

Hirofumi SHIMIZU and Koji SUMINO

Philos. Mag., **32** (1975), 123.

Deformation characteristics of InSb crystals subjected to α-bending or β-bending are observed as a function of the strain rate and the temperature. Difference in the characteristics between the two types of bending is demonstrated. Higher flow stresses are observed in β-bending as compared with α-bending. No difference is found between the two types of bending in the magnitudes of parameters which characterize the strain rate and the temperature sensitivities of the yield stresses. Observations on slip bands as well as those of dislocation etch-pits show that dislocations on the secondary slip system are activated in β-bending. It is suggested that this is the cause of the observed higher flow stresses. It is shown that the motion of screw dislocations of the primary slip system controls the deformation rate in both types of bending.

Polarity in Bending Deformation in InSb Crystals. II. Theory and Supplementary Experiments

Koji SUMINO and Hirofumi SHIMIZU

Philos. Mag., **32** (1975), 143.

A geometrical consideration of the configuration of {111} tetrahedra in a bent

crystal having the sphalerite structure shows that the type of bending is reversed between the primary slip plane and some of the secondary slip planes. This explains why the secondary slip is activated and the primary slip plane becomes forest-rich in β-bending. Two types of experiments establish the origin of the higher flow stress in β-bending compared with α-bending. It is concluded that the difference in the flow stress between the two types of bending in the deformation stage after the lower yield point originates mainly from the difference in the activity of the secondary slip system, while that in the early stage of deformation originates from the difference in the rate of increase in the density of screw dislocations due to the difference in the mobility between α-dislocations and β-dislocations moving on the primary slip plane.

Molecular Correlation Functions in Liquid Carbon Disulfide and Carbon Diselenide

Kenji SUZUKI and P.A. EGELSTAFF
Canad. J. Phys., **52** (1974), 241.

Neutron diffraction structure factors for liquid carbon disulfide and liquid carbon diselenide have been measured and are analyzed to determine molecular correlation functions using the methods developed by Egelstaff, Page, and Powles. This analysis shows that the parallel molecular configuration is more probable in CSe_2 than the T configuration expected from molecular quadrupole interactions. In CS_2 the data are related to the carbon-carbon correlation function, which is shown to be similar to that for monatomic liquids.

Structure of Liquid Gallium and Rubidium by Pulsed Neutron Diffraction Using Electron Linac

Kenji SUZUKI, Masakatsu MISAWA and Yoshiaki FUKUSHIMA
Trans. Japan Inst. Met., **16** (1975), 297.

The static structure factors of liquid gallium and rubidium were measured at several temperatures above their melting points using the time of flight neutron diffractometer installed on the 300 MeV Tohoku University electron linac as a pulsed neutron source. The characteristic oscillation of the structure factor of liquid gallium in a high momentum transfer region has been shown to be well understood in terms of a diatomic molecule-like atomic association with the bond length of 2.69Å. It has been discussed, however, that the subsidiary maximum on the high momentum transfer side of the first peak in the structure factor of liquid gallium may appear due to the second and subsequent peaks in the pair correlation function to shift to a larger distance in comparison with those of simple liquid metals such as alkali metals.